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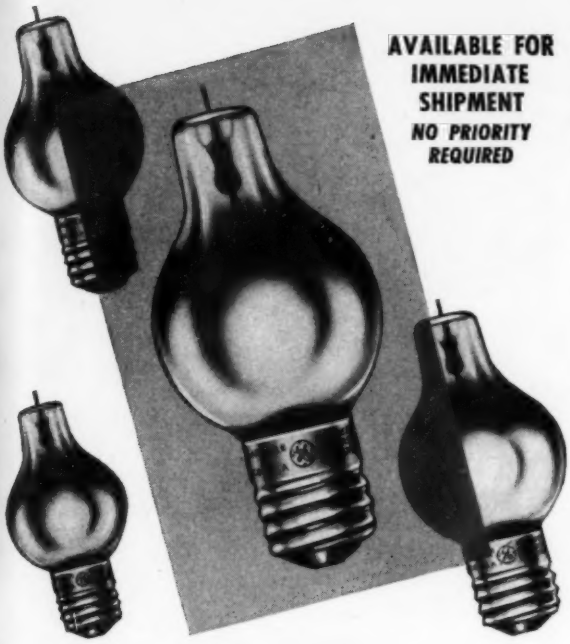

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The Journal of the Telephone Industry

FEBRUARY 24, 1945

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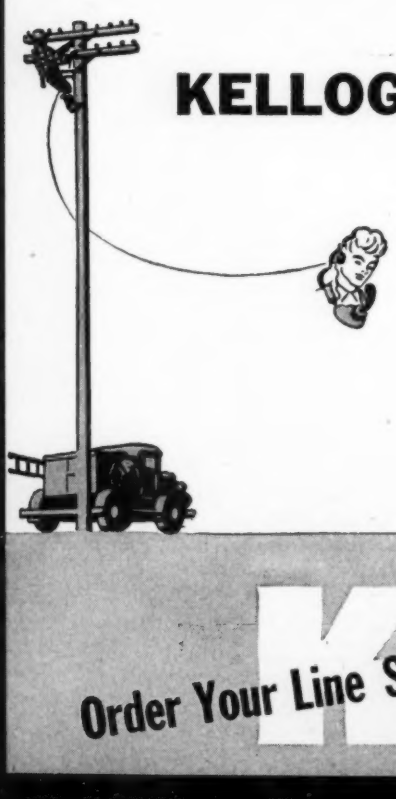

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PLANNING SMALL EXCHANGE

Conversions To Dial

By H. M. STEWART
Vice President
Telephone Service Inc.
Fort Wayne, Ind.

Principal steps to be taken if change in type of service in small plants is to be successful is outlined by Mr. Stewart in address given before recent Minnesota convention.

ALL SIGNS point to a marked increase in the rate of conversions to dial operation in small telephone exchanges as equipment and manpower become available. It is appropriate, therefore, that we take time out to examine some of the important factors to be considered in such a program.

Perhaps it should be made clear at this point that it is not the purpose of this paper to discuss the merits and demerits of dial switching except as they may be collateral to the points to be considered. Our objective, as first stated, is to look into some of the controlling elements that must be cautiously weighed if maximum results are to be realized from a dial conversion. To recognize and properly treat these essential facts is the essence of good management. To ignore them may be disastrous.

To take first things first, a careful survey of the telephone needs of the community should be made. Such a survey is not complete unless it gives consideration to the character of the people, their temperament, social habits and community of interest. Telephone habits are naturally influenced by the geographical, economic and social relationship of a community to other people. A thorough canvass of these quantities is necessary to reliable calculations in determining the soundness of a proposed conversion program. More than that, it clearly defines the type of sales job that must be done.

For instance, if the exchange to be converted is located near a larger center already served over dial equipment, a substantial amount of the educational and sales program may have already been done. This is specially true if a portion of the residents in the smaller community work in the larger one or if there is active rivalry between the two. It is logical to conclude that the affected subscribers in such instances are already "educated" to dial service and will be less skeptical and critical than the citizen of the more isolated section.

It should not be inferred that such a favorable condition removes entirely the need or value of an organized program. I have already said that failure to take the subscriber into the full confidence of the telephone company can prove disastrous. This may be true even though the subscriber is thoroughly familiar with the operation and performance of dial operated equipment. There may be deep-seated and hidden prejudices of long standing that should be sought out and treated. Furthermore, the enthusiasm for dial equipment manifested on the part of any subscriber should be thoroughly cultivated by progressive discussion. Such enthusiasm is helpful in overcoming skepticism and in smoothing the road to a stronger and more equitable rate structure.

With due respect to the many near miracles of modern engineering, no practical way of eliminating a few inconvenient and annoying service impediments has yet been found. The procedure for reverting signaling on a party line is an example. It takes courage to throw the spotlight of attention on such imperfections and deficiencies but is good business to do so. To permit or to encourage the subscriber to accept service while he is laboring under erroneous misconceptions is to invite painful and costly headaches later. To thoroughly acquaint him with doubtful and questionable features and to openly and intelligently discuss imperfections that may have to be tolerated is a challenge to his confidence and cooperative spirit.

The matter of subscriber acceptance is of greater importance in the more isolated community. Here one may encounter some timidity and skepticism toward new fangled contraptions. There is also apt to be some hesitancy toward giving up the so-called secretarial and other incidental services so common in small manual offices—and there is genuine concern over what is to become of "Myrt" when her job is taken over by a mechanical robot.

There is a satisfactory and practical answer to all these issues but such answers should be worked out and submitted before the pattern has been cut

for the proposed change. Skepticism can be overcome by a full and lucid explanation of the mechanics, features and performance of dial equipment. Timidity and lack of confidence in the subscriber can be dispelled effectively if he is given a chance to "get the feel" of a modern telephone equipped with a dial. Splendid results are usually obtained in these small communities where a few modern telephones equipped with dials are passed around for inspection.

It has been found that the difference in the quality of service more than offsets the loss of so-called secretarial features. The ability to quickly establish a desired connection any time of day helps strike a balance to the habit of depending on the operator for such homey tips as to the location of the fire, where the doctor may be reached and the time of day. On the other hand, it is not always necessary to sacrifice all of these by-products of manual service. Ofttimes, most of them may be rendered to an unattended exchange from the control point.

Proper timing is often useful in taking care of "Myrt." Companies operating more than one exchange can usually find a place for her in some other office. Maybe she is planning to get married or maybe she is tired and wants to retire anyway. Perhaps the bookkeeping or collecting may be turned over to her. It is quite important that subscribers to unattended exchanges have immediate access to a reliable source of information at all times. In many instances, a local agent acts in this capacity along with other duties such as collecting and bookkeeping. In passing let us recommend that at least one telephone be made available to the public at all hours of the day or night.

Time will not allow us to dwell too long on the practical values of an aggressive and thorough sales and educational program; but I want to emphatically point out that dial conversions afford an ideal opportunity for revising old and inadequate rate structures; and that the extent and success of any rate adjustment depends on the subscriber's attitude toward his service and on his confidence in the organization behind that service.

The most common and deplorable condition extant among small telephone exchanges is the wholly inadequate and inequitable rate structures universally in force. It is deplorable for the reason that it is seldom necessary, and the management that fails to exploit a dial conversion to its fullest capacity in providing compensatory rates certainly overlooks a golden opportunity. That is why we said in the beginning that no matter how receptive the subscriber may be to the idea, his appetite should be further whetted and his education advanced if the telephone company is to fully capitalize this chance to improve its position and to protect the continuity of the service.

May we digress for a moment to mention that when we say "protect the continuity of the service" we mean just that. Too many telephone people and some regulatory bodies seem to overlook this vital obligation of both the utility and the regulator. It is really more important to the subscriber and to society that rate structures be equal to management needs than that they be equitable to the subscriber. What I mean to say is: He is more likely to suffer permanent injury from rates that are too low than from unreasonably high schedules. It is of more consequence to him that rates be compensatory than it is to the stockholder. The stockholder can usually liquify in one way or another, but the subscriber is powerless to restore damaged service.

We do not propose to make any excursions into the science of rate making at this time, but we don't want to pass the subject without proper emphasis on the splendid opportunity a dial conversion affords for setting rate schedules in order. This is equally true even though present schedules may be producing satisfactory revenue, for the reason that the mechanics of telephone rate making does not stimulate constructive thinking on the subject. It is logical to conclude, therefore, that no matter how adequate the present schedules appear to be insofar as the yield is concerned it is safe to say there is room for marked improvement in their application.

If the telephone company is to live up to its responsibility to the subscriber it cannot take chances on superficial and guess work engineering. The design of the equipment should have the benefit of exhaustive commercial, plant and traffic studies. Service standards suffer from inadequate design while earnings and rates feel the impact of over-investment. The present telephone needs of the community should be determined to an exact degree and having found the current needs the survey should then be extended to immediate and future possibilities.

Such surveys must go beyond merely counting establishments, checking per capita income and comparing social habits. The character of the community should be thoroughly examined to find out what makes it tick. If it is strictly a rural trading center how much territory does it draw from; what are the chances for extending the trading area; what competition is experienced or may be expected from other centers; what is the nature of the money crop, is it seasonal, when and where is it marketed and what effect do weather variations have on it? Finally, how can the telephone service be employed to extend and secure the future welfare of the community?

In an industrial town, the nature of the industry is important. Is it a single industry or is it diversified? Is it a seasonal business or is employment steady? What sort of labor is employed? Is it well-paid, skilled labor, or does it fall in the low-wage brackets? These factors have an important bearing on the type and cost of equipment that may be needed. There is not likely to be a high demand for telephone service among the low-wage group for the reason that it is something of a luxury beyond their social needs. Furthermore, there is not apt to be any great middle class in such a town so that the demand for telephone service is more or less restricted to those in the higher economic bracket. This means that service demands will be limited to higher classifications such as one party lines, which will be reflected in the investment in equipment with a corresponding effect on rate structures. It is one thing to serve 500 subscribers over 200 lines of equipment but another when 400 lines are required to handle a like number; even though trunking requirements are properly weighted.

Now that we have looked in on some of the items to be considered from a commercial administrative viewpoint, let's take a peep at the traffic angle. The history of dial conversions, especially in small exchanges, records many honest errors of omission and commission in respect to traffic demands. Experience has proved that it is impractical to engineer dial switching equipment on the basis of old and accepted standards of traffic flow based on manual operation. This is especially true of magneto equipment. Unless, or until, new standards are established it may be necessary to rely on the old principles as a basis, but they must be heavily weighted if serious consequences are to be avoided.

Two things invariably happen following a conversion. The calling rate climbs rapidly and the holding time expands. This is a perfectly natural result. The improved quality of service encourages more frequent use of the service, and better transmission levels promote longer conversations. Neither of these conditions should be discouraged. On the contrary they bring about just what the telephone company wants in these communities: Better appreciation and more generous use of the service. If service standards

Tense moment on Saipan. Marine radioman, PFC. JOHN VERVAN, Jessup, Pa., kneels, relaying orders to attacking Fourth Marine Division units as officers confer in dugout behind him, formerly a Jap ammunition dump. Enemy shrapnel fell on this spot a few moments after this picture was taken.

are to remain above criticism, these rather certain results must be anticipated and adequate trunking, or paths of communication, provided. Another thing that soaks up surplus trunking is station development. It is not always true that dial conversions are followed by stepped up demands for service, but it is generally to be expected. When an accelerated station development is added to a malignant traffic load, surplus trunking disappears quickly. Trunking apparatus runs into money fast on any modern telephone switching device and is a major item in dial exchanges. On the other hand, since that is *all* we hold out to the subscriber, we cannot afford to be miserly with it.

Greater traffic flow imposes additional burdens upon inter-exchange trunks when more than one exchange is included in a common local service area. Special attention should be given to these trunks to see that they are adequate and properly designed. It may be advisable to install mechanical time limit and cutoff devices in the interest of economy. Repeater and booster apparatus may be needed to insure efficient and dependable operation. The same is true with respect to toll lines. Increased toll business is always a by-product of better transmission standards and faster service.

Comes now the matter of plant. First is the building. It has been found that only two major factors must be considered in housing dial equipment. It should afford maximum protection from dust and humidity. Dial equipment usually will operate under wide variations of temperature if the air is reasonably clean and dry. It is a rather simple matter to install a thermostatically controlled electric heating unit when and where needed. Sometimes these units are placed in the cabinet along with the apparatus. The room should, above all, be as free from dust as conditions will allow if maximum dependability in operation is to be expected. The same is true with respect to humidity.

It is customary to reduce the openings to such rooms to a minimum and to keep them closed except for necessary ventilation. A forced ventilating system with filters over the intake is recommended. These filters pay for themselves many times over in peace of mind, in the ratio of service interruptions and in maintenance.

Rooms for such equipment should be as nearly fireproof as practical, but they need not be elaborate or unduly costly. Hollow tile or brick are popular materials for such buildings. Wooden frame is not objectionable if well-insulated and located at satisfactory distance from other buildings or fire hazards, and adequate precaution is taken to reduce the danger of fire within the building itself.

One of the most compelling arguments in favor of dial conversions concerns outside plant conditions. In fact, it is a rather widely acknowledged professional secret that if the old magneto system was as exacting in its demand for free and unhampered channels of current flow as dial operation, there would be less contrast in the quality and character of service rendered. There can be no mistaking the rigid requirements of a dial system. This is basic since it stems from an elementary principle of electricity. Like gravity, electronic force has a very definite and close affinity for the earth and the two are kept apart only so long as the material or space between is sufficient to resist the pressure of the isolated force. A common demonstration of this is lightning. When the accumulated electric potential rises beyond the insulating property of the air, the reservoir of power breaks through to the ground.

The same is true in telephony. The comparatively small force inherent in the local dry cell requires very little insulating properties; neither is its working power proportionately dissipated by such impediments as high resistance joints. Then too, the line is free of current potential except for the short period of time when the telephone is actually in use.

This elementary principle of electric force becomes more evident, however, when the 24-volt central energy plant is installed for manual common battery systems. The extra power upon the line requires stronger walls of insulation. More than that, the current is on the line at all times so that the pressure for release is constant. For this reason, it has long been an accepted fact that to accommodate a common battery system outside plant must be kept in a much better state of repair, than for magneto, if it is to operate at all.

Since dial operation requires 48 volts of power, the potential search for paths to the earth is double that of the 24-volt system and many times that of the three-volt local battery. Furthermore, the more intricate mechanism is responsive to changes in current values so that it is highly necessary that current flow be maintained fairly constant at all times and that all lines remain absolutely free of all impedance and foreign contacts. Under no circumstances should these rigid rules be ignored. To compromise them is to court disaster. To meet them is to bring about revolutionary standards of service and unqualified customer acceptance.

We urgently repeat, therefore, that no dial conversion should be undertaken without a full and complete re-engineering of all associated plant and equipment. It must be in tip-top shape and must be maintained at that standard, otherwise it would be better to

(Please turn to page 37)

Mr. Welch lists items on communications "coming up" agenda in Washington. . . . Farm Credit Administration already set up to make loans to telephone cooperative and mutual non-profit companies. . . . Berlin's extensive museum of communications developments threatened by war.

THIS WAS somewhat a week of expectation for the communications industry in Washington. The expectation was in the nature of things now in process of accomplishment. First of all, there was scheduled for February 19 a meeting of the State Department's special inter-departmental communications committee which has become quite active in the last few days, following a long period of quiescence. This committee meeting, which will be attended by various government officials, including FCC Chairman Paul Porter, and Assistant Secretary of State Will Clayton, is likely to consider, among other things, the draft of legislation to be recommended to Congress for merger of American interests in international communications.

Whether the recommendation will include American international telephone interests, as well as other international facilities for communication of record, had not been decided. Whether, also, the proposed legislation would be "mandatory" (meaning that all communication agencies would be compelled to put their holdings in the merger pot), or "permissive," was another unsettled problem at this writing. It was known, however, that an earlier plan, ostensibly sponsored by the Navy Department to provide for federal government participation in the directorate of the proposed combination corporation had been abandoned. Such were the unofficial reports reaching your correspondent, at any rate.

Whatever is decided at the February 19 meeting may possibly have some repercussion on the deliberations of the forthcoming Mexico City conference on inter-American matters which was to be attended this week by Assistant Secretary of State Clayton.

* * *

Incidentally, and possibly in anticipation of the Mexican conference, came a report that officials of Aeronautical Radio, Inc.—the company which helps to coordinate and supply the radio needs of various commercial air lines—were trying to work out some plan for coordinating aeronautical radio practices for postwar air traffic between the United States, Mexico, and Canada. This astute step is evidently taken to forestall any possible need for direct government intervention in the field of aeronautical radio — one of the many possible avenues of public ownership invasion in the communications business. The temptation in this direction will be strong in the postwar era, because of the fact that widespread communication facilities now operated by the the American military and naval forces will be left in the hands of government officials—some of whom might be inclined to keep them in their hands and operate them.

Another item on the communications agenda "coming up" was the final arguments on the FCC proposed frequency allocations for the radio spectrum between 25,000 and 30,000 megacycles. These arguments start February 28 and the principal controversy is expected to involve the question of whether frequency modulated radio (or so-called "FM") will be moved "upstairs," as proposed by the FCC, or kept where it is, as the FM operators seem to desire.

It is also expected that the telephone industry will make a final bid to secure some exclusive frequencies for its use. The United States Independent Telephone Association and the Gary group within the Independent industry are still making earnest efforts to have the FCC set aside definite frequencies for telephone use, rather than the unsatisfactory "shared" arrangement proposed in the tentative allocation. This

will especially apply to frequencies for urban mobile use, or so-called "automobile telephones."

It is understood that one member of the FCC, who has been prominently identified for his special interest in the telephone industry, expressed considerable disappointment over the failure of the commission to make some special provision for the telephone industry in drawing up its proposed radio allocations. Thus, there would seem to be at least some hope that the final draft of the FCC radio allocation will give the telephone industry a little better break. But it would not be wise to depend too much upon it.

The final item on the "coming up" agenda is the forthcoming meeting of the WPB Telephone Operations Industry Advisory Committee on March 7 and the USITA executive committee on March 6. The latter will doubtless discuss the important question of rural telephone legislation, upon which it is understood that the USITA special legislative committee is making substantial progress and will no doubt report the same at that time.

The WPB committee will meet, of course, with the Communications Division of the Office of War Utilities, principally on the subject of stepping up civilian manufacture of telephone equipment, including both central office apparatus and telephone instruments. It is known that there has been some flagging in the fulfillment of the quota set by the OWU last year on the resumption of telephone set manufacture. This was due, of course, primarily to the continued stress of war production in prolongation of the German war, manpower shortage, and so forth.

* * *

It has come to the attention of this correspondent that, aside from any consideration of new legislation for possible federal financing of rural telephone extensions and improvements, there is already available means for such federal financing under some circumstances. *Non-profit telephone companies, such as farmer cooperative or mutual companies—but not commercial companies organized for profit—can now borrow from the Farm Credit Administration of the U. S. Department of Agriculture in amounts up to 60 per cent of the value of their properties for rebuilding, expanding, or repairing their facilities. Such loans are made under the Federal Farm Loan Act of 1916, as amended through 1942.*

The general purpose of the Farm Credit Administration, according to the U. S. Government Manual, is "to provide a complete and coordinated credit system for agriculture by making long-term and short-term credit available to farmers. It also provides credit facilities for farmer cooperative marketing, purchasing, and *business service organizations.*"

A cooperative or mutual telephone company serving in a rural area would qualify as a "business service organization." As a matter of fact, a number of companies have utilized these credit facilities, although not a great number. Perhaps that is because the existence of such facilities is not generally known. The terms of interest vary from 2½ to 4 per cent, according to the purpose of the loan. The length of the loan may go as high as 20 years; but it is usually for 10 years or less.

A responsible official at the Department of Agriculture gave your correspondent his unofficial estimate that there had been made probably only about a dozen such loans during the past year. If any mutual or cooperative telephone companies are interested in obtaining such credit facilities they may first write to the Farm Credit Administration for circular No. 6, revised to June, 1941; or to the nearest district office of the Farm Credit Administration. Following is a list of these district offices and the territory which they cover:

Springfield, Mass. — Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey.

Baltimore, Md.—Delaware, District of Columbia, Maryland, Pennsylvania, Puerto Rico, Virginia, West Virginia.

Columbia, S. C.—Florida, Georgia, North Carolina, South Carolina.

Louisville, Ky.—Indiana, Kentucky, Ohio, Tennessee.

New Orleans, La.—Alabama, Louisiana, Mississippi.

St. Louis, Mo. — Arkansas, Illinois, Missouri.

St. Paul, Minn.—Michigan, Minnesota, North Dakota, Wisconsin.

Omaha, Neb. — Iowa, Nebraska, South Dakota, Wyoming.

Wichita, Kan. — Colorado, Kansas, New Mexico, Oklahoma.

Houston, Tex.—Texas.

Berkeley, Calif. — Arizona, California, Nevada, Utah.

Spokane, Wash. — Idaho, Montana, Oregon, Washington.

Commercial telephone companies, meaning those organized for profit and properly managed, may obtain government credit from the Reconstruction Finance Corporation, if the credit risk is sound, from a banking point of view, especially if the company can show that the proposed extension or improvement of local telephone service would in any substantial manner improve food production for war purpose. Unfortunately, under the present shortages of equipment and restrictions on new extensions, this would be rather difficult if not impossible to show in most cases. (RFC loans are not made if private banking credit is available.) RFC loans are available, however, to any good risk company and it is expected that pending legislation in the nature of aid to small war plants may make such loans even more attractive and accessible than at present.

* * *

For the serious student of telephony, the fighting now going on in Germany calls to mind two items of historical significance. First, there is the reported destruction, by air bombardment, of the buildings in central Berlin around the Wilhelm-Strasse. These would necessarily include the Postal Museum in the office of the postmaster general on the corner of Leipziger-Strasse and Maurer-Strasse which is the first street east of Wilhelm-Strasse (the German equivalent of Britain's "White Hall" or our own State Department). Whether the enemy government officials, in panicky Berlin, had the foresight or opportunity to remove to a place of safe keeping all or most of the priceless exhibits is, of course, not known to us at present. In the interest of scientific history it can only be hoped that they have managed to do so.

A good many American telephone people and others interested in communications who happened to visit Berlin before the war generally made it a point to visit the Postal Museum—the only one of its kind in the world. Here was exhibited not only one of the greatest stamp collections in the world; but everything dealing with the art of carrying messages in all forms and in

CANCELED CONVENTIONS

The conventions of the following state telephone associations have been canceled:

Illinois Telephone Association
Indiana Telephone Association
Iowa Independent Telephone Association
Kansas Telephone Association
Kentucky Independent Telephone Association
Michigan Independent Telephone Association
Nebraska Telephone Association
Ohio Independent Telephone Association
Pennsylvania Independent Telephone Association
Spring Executives' Conference of the United States Independent Telephone Association
Texas Telephone Association
Wisconsin State Telephone Association

all ages. There were paintings, models, and literature—including a number of original manuscripts and devices dealing with every detail of the progress in the discovery and improvement of the communications art from the primitive jungle drums to the very latest items in radio and electronic art.

Magnificent paintings included such inspirational scenes as that of a lonely sentry pacing the Roman Wall built by Caesar's legions during the invasion of ancient Britain. He is shown straining his eyes with puzzled gaze towards an erratic series of smoke puffs, coming from the dark forest where the hostile Pict tribesmen were communicating messages. Another scene shows the beacon fires lighted along the British channel to mobilize the English to defend, victoriously, their homeland against the threatened invasion of the Spanish Armada.

Another scene was inspired by the famous saga, the Song of Roland, showing the vain attempt of the lieutenant of Charles the Great to signal his master on an ancient Alpine horn (apparently about 14 ft. long). With this horn, according to legend, Charles heard at a distance of 60 miles; but could not bring the reinforcements in time to save his besieged troops.

There were models of jungle drums, scenes of our own early American Indian runners and pony express. Here were replicas of Alexander Graham Bell's first telephone and the first telegraph instrument of the British inventor, Sir Charles Wheatstone, to whom the Germans apparently awarded the palm over our own American, Samuel F. B. Morse (although Wheatstone used a magneto principle later abandoned).

Germany's own sons in communications science were given prominent display, of course. There were writings and devices of the great Helmholtz (professor of physics at the University of Berlin almost since its inception). Helmholtz's experiments with electric oscillation, inspired his own student, Heinrich Rudolf Hertz (at the suggestion of Helmholtz), to work out the problem of electromagnetic radiations and discover the existence of the so-called "Hertzian Waves." This was the immediate basis upon which Marconi discovered the practical science of wireless telegraphy and which, in turn, led to modern day radio through the discoveries of tube rectification by Alexanderson, the American, de Forest and others (models also displayed).

One exhibit of interest to telephone men was the "musical" telephone of the German professor, Philip Reis (discovered in 1861), which would communicate sounds of the same pitch but not continuous speech. Reis' telephone which was based on theoretical articles by a Frenchman, Charles Bourseul, published in the early 1850's, was the nearest thing to a telephone before Bell made the real discovery (even admitted by the Germans).

Among other models were Chiappe's system of semaphores which used to line the highways out of Paris and which fascinated our own Samuel Morse on his visit to France prior to his own discoveries in telegraphy. Also, there was an interesting account of a system for the transmission of musical sounds by M. Sudre, a Parisian, about 1850, who used an ordinary French horn or long trumpet (ordinarily audible at three-mile intervals) to transmit a code based on different notes of the musical scale. Sudre's invention was seriously considered, because of its advantage of being portable and useful in the dark, by the military authorities of a number of European nations. This was before the success of the telegraph in our own Civil War made them go in for wired communications. An English sea captain, John Taylor, also used horns with compressed air to get varied note signals audible at distances as high as six miles over water through fog and darkness.

* * *

The other item of historical interest is called up by the locale of current fighting in Germany, along the West Wall section between Cologne and Aachen (or Aix le Chapelle, as it was better known, for many centuries, by its French name). It was here that the famous world-wide communications system, known today as Reuters, got its humble start because of a rather interesting circumstance. It seems that in 1849 the new German telegraph line from Berlin came to a stop at Aachen. The French telegraph line from Paris came to a stop at the Belgium line at Verviers. This left a small gap without communications.

The situation inspired a young German, Baron Paul Julius de Reuter to open offices at both ends of the gap and operate large establishments of trained homing pigeons which flew back and forth with dispatches. This simple system, for some time, was the only link in the telegraph communication chain between eastern and western Europe. When the telegraph was finally constructed to bridge the gap, De Reuter moved over to England and started a regular telegraph agency which became thoroughly British and today bears that well-known name. But the bloody terrain through which our troops are now fighting is the same over which De Reuter's pigeons once fulfilled their own tiny missions of communications history. Incidentally, only a few miles from Aachen is the university city of Bonne where Helmholtz and Hertz both taught and where the latter died in 1894.

» For some reason there is an inclination to view private concerns which happen to be known as "public utilities," in a different light than other private industries. The electric industry is a public utility, but it is also a private industry with all the problems of any other private industry. In its current struggle to defeat encroaching government ownership of electric power production, it is fighting a battle in which the welfare of every private enterprise is closely involved. If tax-exempt government competition can be used to destroy a private electric company, it can be used to destroy the business of a shirt manufacturer. The fact that the former may be classed as a public utility, while the latter is not, makes little difference in the basic issue. It is easy enough to declare an industry a public utility — Argentina recently declared gambling a public utility.

When government launches a campaign against private industry, no company, no individual, is immune. If this had been better understood during the past few years, the government power planners in the utility field would have made little headway.—*Industrial News Review.*

» *You are personally bankrupt if you have less than $1,461 in savings and property, according to the Washington Taxpayers' Association. That is what you owed Uncle Sam in November, 1944. By the war's end it probably will be at least $2,000 per capita debt for every American man, woman and child. The high price of liberty and luxury!*—Oregon Independent Telephone Association Bulletin.

ELECTRON TUBES—THEIR USE

In the Telephone Industry

By GEORGE O. TAPPER

AS THE plate supply voltage remains constant, any change in the voltage across the load must be due to a change in the voltage drop in the tube. This is equivalent to changing the DC plate resistance. When the DC plate resistance decreases, the current will, of course, increase in both the tube and the load resistance, as they are in series. Likewise, when the DC plate resistance increases, the current will decrease. As the plate resistance is changing in accordance with the AC signal on the grid, the result is an alternating current in the load resistance.

In this example, the alternating current in the load resistance was calculated to be 2.3 milliamperes (peak value). At 18,000 ohms the voltage across the load will be 41.4 volts (peak value). The amount that the peak values will vary from the calculated values (due to distortion), may be determined from the curves in *Fig. 7* (see Part II). In this example the signal swings the grid from 0 volts to —10 volts. By making a few trial calculations, it can be determined that 5.3 milliamperes on the 0 volt grid curve is the peak value. The plate voltage at this point is 49 volts. The AC components are 5.3—2.5 (the plate current with no signal on the grid) = 2.8 milliamperes and 100 (plate voltage with no signal on the grid) —49 volts = 51 volts; 51 ÷ .0028 = 18,200 ohms, which approximately equals the load resistance. The purpose of these calculations is to find a point on the grid curve where the AC voltage divided by the AC current equals the value of the load resistance in use. On the —10 volt grid curve, 0.5 is the lowest value to which the plate current will drop. The plate voltage at this point is 136 volts. The AC components are 2.5 — 0.5 = 2 milliamperes and 136 — 100 = 36 volts; 36 ÷ .002 = 18,000 ohms.

The plate current will vary from a low of 0.5 to a high of 5.3 milliamperes. The difference divided by two is 2.4 milliamperes. The plate voltage will vary from 49 to 136. The difference divided by two, which is 43.5 volts, is the AC voltage across the load resistance. These AC values, determined from the curves, check fairly close with the calculated values.

PART III. The second installment in this series appeared in the December 30, 1944 issue, page 12.

Again referring to *Fig. 7*, it may be seen that if the load resistance were 0 ohms, the plate current at 100 volts would rise to 13 milliamperes when the grid voltage is reduced to 0. Due to the 18,000 ohm load resistance, the plate current increased to only 5.3 milliamperes and the plate voltage dropped to 49 volts when the grid voltage was decreased to 0; therefore, this decrease in plate voltage of 51 volts is the AC voltage across the load.

The AC current and voltage values determined above are peak values. The root mean square (RMS) value in watts will be

$$\frac{.0024}{1.414} \times \frac{43.5}{1.414} = \frac{.0024 \times 43.5}{2} = .0522 \text{ watts.}$$

Telephone voice current is a complex wave which is equivalent to a combination of single frequencies, from about 250 to 2,800 cycles per second. The value of the current is much greater at the lower frequencies. The maximum capacity of the tube at its operating voltages will be utilized only at the lower frequencies. The average speech power over a period of time is much less than the maximum instantaneous power value, therefore, the distortion described above occurs, almost entirely, at the instant when operation is near the maximum tube output.

Graphical methods are usually accurate enough to determine the AC voltage and current values from the plate characteristic curves. These methods are based on the fact that a straight line can be drawn through the points that correspond to the following three in this example:

(1) 5.3 milliamperes and 49 plate volts on the 0 volt grid curve.

(2) 2.5 milliamperes and 100 plate volts on the — 5 volt grid curve.

(3) 0.5 milliamperes and 136 plate volts on the — 10 volt grid curve.

Audio-frequency transformers are relatively large and expensive when fidelity and power efficiency is desired over a wide frequency and power range. In lieu of transformer coupling, resistance coupling is extensively used. *Fig. 11* illustrates a resistance coupled tube. At 2.5 milliamperes DC plate current, the DC voltages will be as follows:

Plate resistor R1 (36,000 ohms) ..... 90 volts

CORRECTION

In the second installment of this article appearing in the December 30, 1944 issue, three errors appeared. Corrections for these errors are as follows:

(1) On page 13, the next to the last line in the table in the first column should have read, "Transconductance — 1,150 — 1,450 — Micromhos."

(2) In the second line in the paragraph following the above table, the letters "RP" should have been "rp."

(3) On page 30, the third line in the second column should have read "ohms is in series with the AC load, . . ."

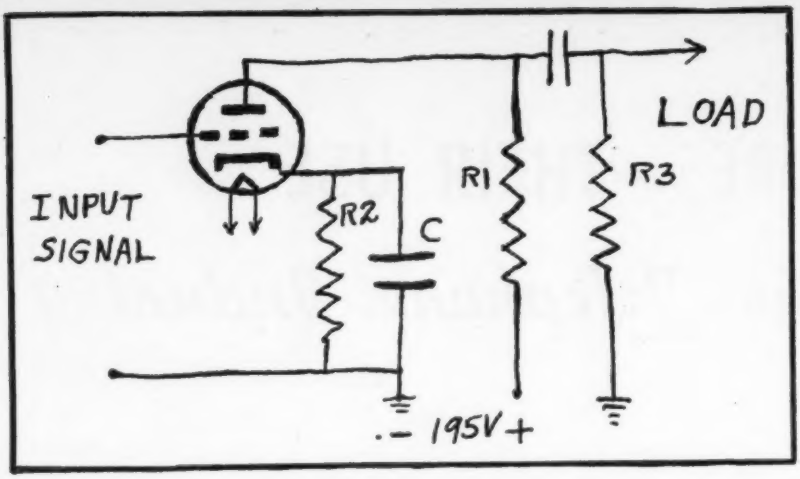

Fig. 11.

Cathode resistor R2 (2,000 ohms)	5
Plate voltage	100
Plate supply voltage, required	195 volts

If a 5 volt AC signal is connected to the grid of the tube in *Fig. 11*, the AC voltage in the plate circuit will be 69 volts (5 × 13.8 amplification factor). The AC load is 18,000 ohms as the load resistor R3 (36,000 ohms) is connected in parallel with the plate resistor R1 (36,000 ohms) through the DC blocking condenser C. The voltage drop in the condenser C may be neglected. The voltage across the load resistor is the same as in *Fig. 9* (see Part II), which is approximately 43 volts, peak value. The AC current in *Fig. 11* will divide, half going through the plate resistor R1 and half going through the load resistor R3 (this is the useful load); therefore, this resistance coupling is only 50 per cent efficient. Transformer coupling may be 90 per cent efficient, but resistance coupling costs less and occupies less space.

A value of 36,000 ohms was selected for the resistors in *Fig. 11* so that the voltage and current values could be readily compared with those in *Fig. 9*. In practice the plate resistors are from .05 to 0.25 megohms and the load resistors (called the grid resistor if connected to the grid of the next tube) are from 0.1 to 0.5 megohms with tube No. 76. The choice of resistor values depends on the output voltage and current values desired. As an example, the resistance coupled amplifier chart lists tube No. 76 as producing an AC output of 59 volts (peak value), measured across an 0.5 megohm grid resistor (R3 in *Fig. 11*), with an 0.25 megohm plate resistor (R1 in *Fig. 11*) and with a 180 volt plate supply. The above values may be checked by means of the curves in *Fig. 7*.

The AC current in grid resistor R3; 59 volts ÷ 500,000 ohms = 0.12 milliamperes (peak).

The AC current in plate resistor R1; 59 volts ÷ 250,000 ohms = 0.24 milliamperes (peak).

Total AC current 0.36 milliamperes (peak).

We will assume that the 0.36 milliamperes of AC current will be produced by varying a DC plate current of approximately 0.4 milliamperes plus and minus 0.36 milliamperes (from 0.04 to 0.76 milliamperes). When the signal reduces the grid voltage to 0, the plate current will be 0.76 milliamperes. On the 0 volt grid curve, 0.76 milliamperes of plate current occur at a plate voltage of about 10. Adding these 10 volts to the required AC output voltage of 59 gives the plate voltage with 0 signal voltage on the grid.

These 0 signal values of 69 plate volts and 0.4 milliamperes intersect on the —6 volt grid curve. This means that the AC signal on the grid was 6 volts, therefore, the grid voltage will swing to —12 volts. The minimum plate current of 0.04 (0.4 — 0.36) milliamperes and the —12 volt grid curve intersect at about the 130 volt plate value. The difference between 130 and 10 divided by 2 gives an AC output of 60 volts which is close to the 59 volts we started out to check. This corresponds approximately to plus and minus 59 or 60 volts from a plate voltage of 69 or 70.

To obtain the —6 volt grid bias, the value of the cathode resistor would be 6 volts ÷ .0004 amperes (this is the 0.4 milliamperes plate current with a 0 signal on the grid), which equals 15,000 ohms. The listed value is 14,700 ohms.

The plate voltage required, will be:

On plate of tube, calculated above	70 volts
Voltage drop in plate resistor R1, 250,000 ohms × .0004 ampere	100 volts
Voltage drop in cathode resistor (grid bias)	6 volts
Total	176 volts

The listed plate voltage is 180 volts.

(Please turn to page 24)

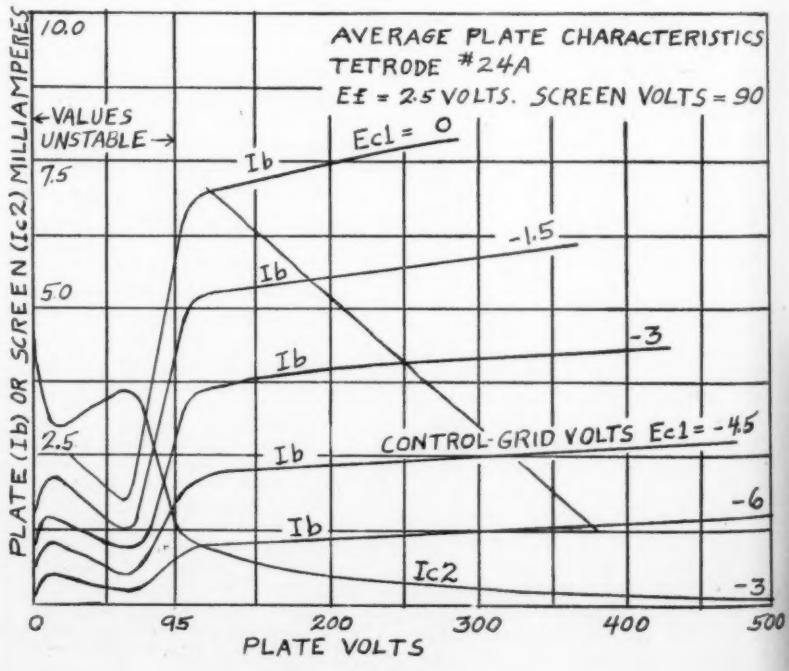

Fig. 12.

Laboratories . . .

The technical organization of Automatic Electric Company includes a group of highly skilled and experienced specialists in research and development, comprising the staff of the Automatic Electric Laboratories.

These men, under the direction of K. W. Graybill, Chief Engineer of the Company, and C. F. Ffolliott, Technical Director of the Laboratories, are continuously engaged in a broad scope of activities ranging from pure and applied research, through all stages of product design and improvement, to the solution of practical problems involved in the creation of new systems and equipment to meet growing requirements in the broad fields of communication and electrical control.

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R E C T O U R S P E C I A L I S T S

While the above figures check closely with the listed values for this tube, the chances are that accurate measurements of an actual circuit would not check this closely due to quantity production variations in tubes and resistors.

The curves and values listed for the various tubes are average characteristics, some values of individual tubes may deviate 20 per cent or more from the listed characteristics; therefore, a margin of safety is required. It is good practice to design amplifiers with sufficient gain to allow for the normal variation in material and workmanship of component parts, such as tubes, resistors, condensers, etc. If the gain in individual units turns out to be more than required, it can, of course, be reduced by turning back the volume control. This is analogous to the use of a field rheostat to adjust the voltage of a rotating type of generator. The generator designer uses the field rheostat to correct for variations in material and workmanship.

In view of the variations in tubes, resistors, etc., it is poor practice to design quantity production electron tube equipment to close limits that require the selection of individual tubes or other parts. With such designs the man in the field runs into difficulties when the replacement of tubes, resistors, condensers, coils, etc., becomes necessary.

In the listed characteristics of an electron tube, the unit of transconductance is a micromho. As telephone men do not use the unit "mho" every day, perhaps a review is in order. "Mho" is the word "ohm" spelled backwards. It is the reciprocal of the ohm.

A circuit of 2 ohms resistance has a conductivity of $1 \div 2$ or 0.5 mho. A circuit of 10 ohms resistance has a conductivity of $1 \div 10$ or 0.1 mho. One volt may be considered as conducting 0.1 ampere through a circuit which has a conductivity of 0.1 mho; 5 volts $\times$ 0.1 mho $=$ 0.5 amperes, etc. In the first column of the characteristics of tube No. 76, the AC plate resistance is listed at 12,000 ohms. The conductivity is, therefore, $1 \div 12{,}000 = .0000833$ mho, or 83.3 micromhos. Due to the amplifying action of the tube, one volt change on the grid is equal to 13.8 volts change in plate current; therefore, the transconductance of the tube is 13.8 $\times$ 83.3 micromhos, or 1,150 micromhos. Transconductance is the control-grid-plate transconductance.

As pointed out before, the listed characteristics hold true only with very small differences of current and voltage as the amplification factor and plate resistance change as the slope of the curves in *Fig. 7* change. However, to illustrate transconductance, large differences will be used in order to obtain readable values. On the 100 plate voltage line in *Fig. 7*, the difference between the plate current values at the —4 volt grid curve and the 0 volt grid curve is 8.8 milliamperes (8,800 microamperes). Dividing this value by the 4 volt change in grid voltage gives a transconductance of 2,200 micromhos. A rough check of this answer may be made as follows: Calculating the plate resistances and amplification factors as previously explained, the following values are obtained:

	Plate resistance	*Amplification factor*
At 0 volt grid and 100 volt plate	6,000 ohms	15.60
At —4 volt grid and 100 volt plate	8,500 ohms	15.00
Average	7,250 ohms	15.3

From the above results, $1 \div 7{,}250 \times 15.3 = 2{,}111$ micromhos transconductance. This checks fairly closely with the calculated value of 2,200. As the same plate voltage was used for the above two current values used in calculating the transconductance, it means that there was no external voltage drop. The load was 0 ohms; that is a short circuit between the plate and plate supply voltage. The transconductance expresses the amount of AC current caused to flow in the plate circuit by a small voltage change on the grid when the load resistance is 0. Transconductance combines in one value, the plate resistance and the amplification factor.

The three electrodes of a triode act as plates of minute condensers. These capacitances are so small that their effect is of importance only at radio frequencies. At radio frequencies the capacitance between the grid and the plate may cause electrostatic coupling between the input and output circuits. A feedback from the output through this capacitance to the input may be re-amplified and fed back a number of times until it builds up sufficiently to cause unsatisfactory operation.

The capacitance between the grid and plate can be made small by the insertion of an additional electrode between the grid and the plate. This electrode is named the "screen grid," or simply, "screen." The screen acts as an electrostatic shield between the grid and the plate and thus reduces the grid to plate capacitance. As this type of tube has four electrodes, it is known as a *tetrode*.

Another advantage of the tetrode is that higher voltage amplification is possible; therefore, a high ratio step-up transformer is not required for a high resistance load. *Fig. 12* illustrates average plate characteristic curves for a typical tetrode. The voltage gain will be calculated for a few values to show how the high voltage gain may be realized. Draw a straight line through the following three points on the curves in *Fig. 12*:

(1) At 7 plate milliamperes where the 0 volt grid curve and the 120 plate voltage line intersect;

(2) At 4 plate milliamperes, —3 volts grid and 250 plate volts (these are the DC values with no signal on the grid);

(3) A straight line drawn through points (1) and (2) will intersect the —6 volt grid curve at 380 plate volts and 1.35 plate milliamperes.

Taking the difference between the plate voltages of points (1) and (3) and dividing by 2 gives a peak AC voltage of 130. Likewise, the AC current is $7 - 1.35 \div 2 = 2.8$ milliamperes; $130 \div .0028 = 46{,}400$ ohm load. The signal on the grid was 3 volts, therefore, the output voltage is 43 times the input. Other values will give the following results: Locate point (1) at 5.2 plate milliamperes, 110 plate volts and —1.5 grid volts. Use the same point (2) as in previous example. Locate point (3) on the —4.5 volt grid curve. The results will be $420 - 110 \div 2 = 155$ volts AC peak value and $5.2 - 2.6 \div 2 = 1.3$ milliamperes AC, peak value. The load resistance will be 120,000 ohms. As the signal was 1.5 volts, the output is 100 times as large as the input.

From the above results it is apparent that the voltage gain increases in ratio as the load resistance increases provided the signal or grid voltage swing is decreased. The voltage amplification across the load, due to the tube, is expressed as follows:

$$\text{Voltage amplification} = \text{Amplification factor of tube} \times \frac{\text{Load resistance}}{\text{Load resistance} + \text{Plate resistance}}$$

At point (2) in the preceding examples, the tube amplification factor is 630 and the plate resistance is 600,000 ohms. With a 1,000,000-ohm load resistance, the voltage output will be 394 times the input. This voltage gain could occur at only a few volts output because the amplification factor and plate resistance decrease as the plate voltage decreases due to the signal on the grid. At 180 plate volts and —3 grid volts, the amplification factor is 400 and the plate resistance is 400,000 ohms.

(To Be Continued)

THE PLANT MAN'S NOTEBOOK

BY RAY BLAIN • TECHNICAL EDITOR

THE NEW JERSEY Bell Telephone Co. has made a color motion picture, with narration recorded on the film, as a means of giving increased emphasis to the importance of safe working practices. Pole climbing is one of the important job operations of telephone outside plant forces. Unless performed safely, a workman will "cut out," slip and fall. Safe and proper climbing has been taught in some form from time to time by all telephone companies to groups of field men, both new and experienced.

In view of the fact that accident reports of the New Jersey company showed 166 cases of "falls from poles" in the past six years with 33 of these resulting in lost time or disability assignments, it was felt desirable to record the newest pole climbing techniques in a motion picture as an aid in the periodic retraining of field workmen and for teaching new men to climb when the occasion may arise.

This film is now being shown throughout New Jersey to all employes who may have occasion to climb poles. Anyone seeing it will readily agree that pole climbing is one of the skilled jobs of the telephone industry, and one which is learned only by constant practice of all the little details. A good climber never forgets the importance of doing these little things correctly. He realizes that they make up the technique that has been proved best by long experience and constant study. That's why he doesn't have accidents —why he climbs so smoothly and with so little effort. It is hoped that all men who climb poles for a living eventually may have an opportunity to see this remarkable picture.

* * *

We received a letter from R. E. Blaylock, manager of the Lamar County Telephone Co. at Millport, Ala., referring to a recent item on this page concerning the possibilities of the plug-in feature of equipment for manual switchboards. Mr. Blaylock states:

"Perhaps you would be interested to know that we have such a switchboard in service in our Kennedy exchange. It was manufactured by the old American Electric Co. and the record is not clear as to just when it was placed in service. It is claimed that it was the first switchboard installed in this exchange. I have been here 14 years and it had already been in service many years prior to that time.

"The drop and jack are inclosed in a metal frame open at the top and bottom. The jack springs extend at the back to make the connection in a plug and jack arrangement. A rod, fitted through each vertical row, both completes the night alarm circuit and helps to hold the drops in place. To remove any one drop or jack, one simply removes the rod in that vertical row and removes the drop by pulling forward. This equipment is substantially built and, except for night alarm contacts and occasional burned out drop coils, causes no trouble at all. The entire drop may be removed and taken apart in a minute without disturbing any of the wiring or poking around in the back of the switchboard. The drops are of the shutter type and are self-restoring, which might date the switchboard to some extent. With modern manufacturing methods, no doubt these drops could be made even better and smaller which should really be worthwhile."

This is a most interesting switchboard description and is entirely foreign to anything we have ever seen. It also causes us to think that perhaps some old abandoned ideas were not so bad after all.

* * *

We do not, ordinarily, feel qualified to make long range predictions, but we do have a desire to make an observation at this time with reference to possible future developments of the telephone type storage battery. It is probable that the storage battery of the future will be contained in neither a glass or hard rubber jar, but one made of transparent plastic. If this plastic proves suitable for the nose of a bomber, it certainly will handle the storage battery problem without difficulty. This type of jar will be stronger than either rubber or glass and breakage in shipment probably will be eliminated completely. The cell covers could be made from the same material, which would insure ease of inspection. Corrosion starting to form around the terminals could be detected instantly. This certainly would be a praiseworthy improvement in battery design.

* * *

Harry G. Proctor, writing in the Philadelphia (Pa.) *Bulletin* says:

"Most newspaper readers have seen pictures of an American soldier huddled in a fox hole and cuddling to his ear and mouth the receiver-transmitter of a telephone while enemy bullets and shells tear through the air over him.

"This lonely soldier, cut off for the time from all physical contact with the rest of mankind, yet was in speaking touch with his fellow men and giving them directions for placing their fire in the best possible way to inconvenience the enemy. He was an Army Signal Corpsman.

"He was only one humble human unit at the outer end of a network of wires and radio communication that circles the globe. Under the impact of the greatest war in history, the U. S. Signal Corps has mushroomed from its humble beginning in 1860, with three men using signal flags by day and torches by night, into the greatest system of communication ever conceived."

by MAYME WORKMAN
traffic supervisor
the Illinois Telephone Association
and traffic editor

THE OPERATOR'S CORNER

FOR MANY years traffic conferences have been an important part of The Illinois Telephone Association's annual meeting and their district meetings. It is encouraging to note the trend toward greater interest in the traffic department and its personnel.

The December issue of the Canadian *Telephone Journal* stated, "For the first time in the history of the Canadian Independent Telephone Association, glamour—with a very definite and apparent seriousness of purpose in enthusiastic business sessions—attended the October 1944, annual convention."

When the Canadian *Journal* arrives at our office, the writer usually turns to "Telitfunny—In the Realm of Telephony." This page contains many interesting anecdotes. After reading them, the writer relays her favorite ones to the other members of the office force who enjoy a hearty laugh, something very valuable during these trying and troublesome times.

In the December issue, however, the writer's attention was attracted by the words "Operators' Conference" and a group picture of comely young women, so—"Telitfunny" had to wait while the writer perused the following paragraph, a part of the report of the 39th annual convention of the Canadian Independent Telephone Association held in Toronto, Canada, on October 25 and 26.

"The operators' conference, an innovation this year, proved particularly successful. Thirty-one operators from many parts of Ontario, including northern Ontario, attended and participated in the discussions and program arranged by Miss A. Mathias of the Bell Telephone Co. of Canada. Miss Mathias, as convenor of the program, and as chairman of the discussion groups, reported most enthusiastic meetings. 'They just hate to take time out for lunch,' Miss Mathias told the *Journal*. The girls were kept busy in their own sessions throughout Wednesday afternoon and all day Thursday. The only time they spent with the general convention was on the Wednesday evening when they were guests of the association and the manufacturers at the annual banquet. Executives of telephone companies who had sent operators to the conference as well as CITA officials, unanimously agreed that the operators' conference was an outstanding success and should be repeated in future years."

Evidently, our neighbors in Canada are no exception to the rule that operators are eager to learn ways and means of improving telephone service to their customers. Congratulations on a successful conference! We hope you will have many more in the future.

Questions from Illinois Operators

(1) Should the toll center deal directly with the subscriber?

(2) Are you compelled to repeat on a long distance call if the parties cannot possibly hear or understand one another?

(3) When taking peg count, should a ring-off drop signal for a re-ring be pegged as a separate local call?

(4) On a ticket locate, how should the reports be shown on the ticket?

(5) I asked for long distance at the toll center and while waiting for her to answer, someone else from that toll center came in on this trunk and asked for a number. Should I release the trunk after explaining that I was waiting for long distance?

The answers to these traffic questions are presented on page 38.

Best Story of the Week—What's Yours?

A timid, 17-year-old Amish* boy approached the telephone attendant at a railroad station in Harrisburg, Pa., with money in his hand to pay for a call, and pointed to the telephone saying: "How do you use these things?"

The attendant quickly offered to help him and the lad explained that he was supposed to get off the bus at Lemoyne, Pa., where he was to be met by a farmer on whose farm he was to work—but the bus didn't stop there.

For an hour and a half the attendant got only "DA" as she tried to call the farmer, but finally he answered and the situation was explained. The farmer asked to talk to the boy and the attendant took the youth to a booth, placed the receiver in his hand, and told him to talk into the transmitter. The conversation lasted for some time. When the boy didn't reappear, the attendant went to the booth and found him still sitting there, almost dozing, with the receiver against his ear—although the farmer had hung up!—*From an article by Paul J. Jones, assistant district traffic superintendent, Bell Telephone Co. of Pennsylvania, Harrisburg, in* THE TELEPHONE NEWS.

*Follower of Jacob Amen or Ammann, strict Mennonite of the 17th century, several of whom settled in Pennsylvania. Historically the Mennonites have stood for Scriptural authority, plainness and sometimes peculiarity of dress, aloofness from the state, restriction of marriage to their group, etc.

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ACCOMPLISHMENTS OF THE

436th Signal Battalion

Modern armies can move, perform and win victories only to the degree that vital lines of communications permit. Without extensive message systems, large scale operations and global organization to gain victories over aggressor countries would be incalculably hampered. The advances which now take a few days would be lengthened into many months.

An organization which has reason to know this from its own experiences and accomplishments is the 436th Heavy Construction Signal Battalion, an outfit with a record of over two years of line stringing in the Southwest Pacific. Its personnel is largely made up of former employes of American telephone companies.

Communications lines have gone over many thousands of miles of deserts and unexplored jungles. In the Australian Desert alone, the battalion's work was equivalent to laying a talking line between New York and San Francisco. Its accomplishments form the basic skeleton of the entire communications network which holds the theater together and constantly enables greater expansion towards the land of the setting sun.

From its work in the first combat zone in the theater, the battalion has gone on in similar fashion through every other combat zone as our advances have created them. Often during these treks, they have functioned as far as 200 miles from the nearest supply base.

Possibly the greatest, certainly the toughest, assignment the unit has to its credit is that of stringing over 100 miles of line between Lae and Finschaven, a saga of heroic accomplishment through terrain never before traveled by white men.

Working along a precipitous mountain range that paralleled the shore, the lack of roads, or even native trails, made it necessary to work from barges most of the way. In addition to infiltrating Japanese snipers, the men fought terrain and fever, while pushing their mission to completion, thus permitting the establishment of another base nearer Japan.

Involved in the project was the putting in of poles and stringing a 16-wire, eight-circuit line carrying 13 potential voice channels and 12 telegraph channels over a 30-foot right of way. Each pole required two cross arms with four circuits each, and all were strung with 200-pound bare copper wire. The use of vehicles was out of the question and manual labor alone supplemented the barge hauling.

Poles, crossarms, wire, nuts, bolts, tools and food had to be carried inland on the backs of the signalmen to the heights above where the line was to pass. Aching and bruised bodies had to be protected by salvaged Mae Wests, or airplane life belts. Sometimes two charges of dynamite had to be used to blast trees 12 ft. in diameter from the right of way.

The barge hauling itself, though less strenuous, was if anything more dangerous, since it involved day and night travel through largely uncharted waters filled with knifesharp coral reefs, wreckage and debris. Navigation had to be performed by men who learned as they went.

On land, the way was hacked forward through walls of green jungles and quagmires armpit-deep. Visibility seldom exceeded 10 feet and compasses were always a necessity. The use of native wood was impracticable because swamp rot quickly affected the hardiest of them, although it scarcely prevented their intertwined branches from binding them so closely together as to add to the task of the clearing axemen. The ground was too soft and oozy to hold the tubular collapsible poles until logs had been laid to which they could be bolted at right angles.

In the months required to build the line, the men of the 436th crossed 10 river barriers, as well as innumerable streams unrecorded on the largest scaled maps. At the end of the course, the line had to be pushed to completion over Langemok Bay since mountains arising directly from the ocean precluded any alternative approach.

The obstacles could be multiplied. Ants, mosquitoes, thorns, thickets, holes that widened into useless craters from torrential rains before poles could be placed, bridges constantly requiring rebuilding because of swollen streams—all conceivable handicaps were there to plague the unit. On one occasion the line had to swing over the mountains almost two miles inland to by-pass precipitous rapids.

Food supply lines were tenuous and precarious. With a diet of bully beef and hard tack, cocoanuts and fish, infrequently supplemented by bananas bartered from the few natives, the men ate as circumstances dictated. But throughout, the most persistent problem for these nonseamen was to acquire, maintain and operate their boats and barges.

The line consumed communications supplies at the rate of six tons a mile.

Despite all, the line reached Finschaven less than a month after the town was taken. The 436th went on to establish maintenance crews along the route in the form of a tiny garrison every 10 miles. Some indication of the acclaim the unit won for its work may be gleaned from the fact that a half dozen sergeants received direct commissions in the field as a result of the job.

Tasks like these of the 436th are never done, at least as long as any Jap resistance remains in the Southwest Pacific. Now the unit has moved on to Morotai, where they arrived with the infantry on D-Day to install the basic communications system there. Its members are firmly confident that no task to which they may be assigned in the future will surpass in difficulty that of the "Barge Built Line" in New Guinea.

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● *Photograph of switchboard, equipped with the Calculagraph, courtesy of The North Electric Manufacturing Company.*

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REA Suspends Loans After Private Company Wins Case

In a recent order suspending further loan allotments for Kentucky, as a result of an order issued by the Kentucky Public Service Commission on January 22 allowing the Kentucky-West Virginia Power Co. to build 1,156 miles of extension to rural power lines in East Kentucky, it would appear that the Rural Electrification Administration is endeavoring to thwart extension of such rural lines on the part of private power companies.

The order suspending loan allotments was signed by William J. Neal, St. Louis, Mo., acting administrator of REA, and was effective February 13.

Mr. Neal's order explained that REA cannot make loans unless they appear to be self-liquidating. If power companies are to be given the cream of rural service in Kentucky, he added, future loans must be examined in that light to determine if they are good risks.

Some $3,000,000 of allotments are affected immediately, as well as the proposed $30,000,000 postwar expansion program planned by Kentucky REA co-operatives, it was said by W. Lyle Sturdevant, St. Louis, head of REA Region No. 3.

Managers of every co-operative in Kentucky pledged financial support to underwrite an appeal to the courts in event the public service commission does not grant a hearing of the Kentucky-West Virginia case, it is said.

It is the contention of Kentucky co-operatives that they cannot extend service to sparsely settled rural areas if the public service commission allows private utilities to tap densely settled rural areas.

Kentucky is the third state in which REA has suspended loan allotments after similar actions on the part of commissions, it is said. Allotments were suspended in West Virginia for four months and in Virginia for seven months.

It is understood that a petition for rehearing was filed with the commission on January 20 by REA co-ops. The commission has 20 days to grant or deny it, and if it is denied, the co-operatives have 20 more days in which to appeal to the courts.

Mr. Sturdevant is reported to have told co-op managers that $750,000 allotted four East Kentucky co-operatives last July now "is not worth the paper it is written on" because the public service commission has ruled the expansion may be made by the private power company instead of the co-operatives in whose territory the proposed new service lies.

It is reported that Mr. Sturdevant stated that, as of October 31, 1944, REA had allotted to Kentucky co-operatives $17,263,855, of which $12,103,382 has been advanced. As of the same date 13,427 miles of REA lines were serving 48,576 rural consumers, but 75.7 per cent of rural homes were still without electric service, it is said.

The public service commission order, handed down January 22, gave the Kentucky-West Virginia Power Co. authority to make 151 rural extensions, totaling 1,156 miles, to serve 7,108 additional farm homes in the 16 mountain counties already served by the utility. The project is estimated to cost $2,085,508, and is scheduled to proceed as rapidly as priorities and materials can be obtained.

R. E. Hodges, general manager of the power company, testified at the commission hearing last summer that if the permit were granted he proposed to reduce rural rates in the aggregate of $18,500 the first year and $4,000 further the second year.

Managers of the four co-operatives testified they already had projected plans to serve the territory in issue, signed up customers, secured rights-of-way easements and applied for allotments to finance the work as quickly as developments would allow.

V V

Extend Filing Time in Utah Impounded Fund Case

Time for filing a motion for rehearing in the Mountain States Telephone & Telegraph Co. mandamus against the Public Service Commission of Utah was extended, January 29, to February 8 by the Utah Supreme Court. (TELEPHONY, January 20, page 30.)

The court ruled against the commission on January 9, directing that it release a $230,000 impounded fund from a Salt Lake City bank as alleged overcharges in a rate hearing.

V V

Holds Contractor Liable For Cable Damage

The court of appeals, first appellate district of Ohio, in the case of The Cincinnati & Suburban Bell Telephone Co. vs. Eadler, on December 11, 1944, ruled that a contractor, who damaged telephone underground equipment in excavating work, is liable for the damage.

The court held that the abutting landowner's contractor, who removed lateral and sub-soil of street in making an excavation to erect a building on adjoining land, is liable for damage to telephone company's underground equipment lawfully in street, where damage resulted from failure of contractor to protect sub-soil of street and equipment

THIS CABLE SPLICE *Will Be 100% Dry*

...Because the free-flowing, scientifically-processed small mesh size of PROTEK-SORB* Desiccant distributes the material evenly throughout the splice, absorbing moisture instantly. And, being sealed within the sleeve, Protek-Sorb Desiccant's maximum capacity keeps the splice permanently dry. **IT KEEPS WORKING AFTER THE SPLICE IS CLOSED!** Normal insulation resistance is restored more rapidly . . . uninterrupted, trouble-free service is assured.

Easy-to-use Protek-Sorb Desiccant is chemically inert . . . will not attack metals or insulation . . . makes the safer, speedier desiccant method of drying cable splices *more efficient than ever!*

Protek-Sorb Desiccant is obtainable from your regular telephone jobber in convenient containers holding predetermined amounts for most economical use.

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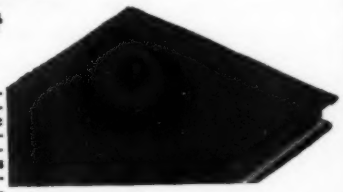
What the COMMUNICATIONS WORKER NEEDS

to know about electricity



Radio men, telephone engineers, telegraphy technicians — all workers in the communication industry — here is a book written expressly for you. It gives you a clear, practical explanation of the fundamentals of electrical engineering *upon which communication is based.* All the explanations, all the illustrations, all the applications are taken from the communication industry and not from the power industry.

THE ELECTRICAL FUNDAMENTALS OF COMMUNICATION

By A. L. Albert, Professor, Communication Engineering, Oregon State College; Professor, Electrical Engineering, Purdue University (1942-43); 550 pages, 6x9, 359 illustrations, $3.50.

Presents the electrical fundamentals of communication, including the three divisions—telegraphy, telephony, and radio with its allied branches. Starts with electronics, explains what the communication technician wants to know about direct current, conductors, resistors, insulators, and discusses such topics as the magnetic field and inductance and the electric field and capacitance solely from the point of view of the communication industry.

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1/8 Pint Can (50 grams) 48 per Carton.
1/2 Pint Can (200 grams) 12 per Carton.
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For sale by the Manufacturer and leading telephone supply houses.

W. A. HAMMOND DRIERITE COMPANY

XENIA, OHIO

located therein by shoring or other means.

Whether the municipality owned an absolute fee in street or a conditional fee for street purposes, the use of street by the telephone company for its underground equipment would be justified as serving a public purpose, the court said. The defendant could not avoid liability by employing an independent contractor to do the work; the duty to use care to ascertain existence of underground equipment and notify telephone company of intention to excavate was held absolute and non-delegable.

V V

Commission Approves Change In New Jersey Company

The New Jersey Board of Public Utilities Commissioners approved, February 16, a reorganization of the New Jersey Telephone Co., under the control of C. Wallace Vail, Newark lawyer, who has been trustee of the company in chancery court proceedings.

The company serves about 652 subscribers in Warren County communities, including Belvidere, Blairstown, Great Meadows, Hope and Oxford.

Samuel T. Beatty of Belvidere, who was the agent of the old company, acquired 6,520 shares of common stock and 2,500 shares of preferred stock together with proprietary interests in the old company.

It was disclosed that under the reorganization plan, Mr. Beatty will transfer all of this stock to the new company, receiving in exchange 1,500 shares of capital stock in the new company. Mr. Vail will give the new company any rights he has in the old and Mr. Beatty then will transfer his 1,500 shares of new stock to Mr. Vail, giving the latter complete control and management.

"It will be noted," said the board's certificate, "that these matters come to the board with the approval of the court of chancery. That court has already passed upon the question of proprietary rights of all parties in the old company. Accordingly, the relative rights of conflicting claims to assets of the old corporation are matters within the province of the court and were not before this board for determination.

"Nor is it within our province to pass upon the validity and effect of the steps taken by which the trustee of the old corporation (Mr. Vail) has purchased or is about to purchase all assets administered by him as trustee.

"Furthermore, more than one year has passed since the filing of the original applications and no complaints, oppositions or objections have been received by the board against the granting of the applications."

The certificate says the value of the company originally was put at $120,575 and that after deducting $30,000 for depreciation it had a net value of $90,575.

The board said its main concerns involve the ability of Mr. Vail to give subscribers adequate service at reasonable rates, and the financial position of the company.

V V

Lists 25 Places in Drive To Remove Gamblers' Telephones

A list of 25 establishments in Columbus, Ohio, "suspected of violating the city gambling ordinances," has been certified to the Ohio Bell Telephone Co. for discontinuance of telephone service, Safety Director C. C. Cole announced February 7.

The certification follows the request of the Federal Communications Commission and Board of War Communications to telephone companies to take steps to "reclaim the facilities and manpower employed in the dissemination of racing information."

The director did not make the list public. He said that the list contains names of establishments "suspected" of numbers writing, as well as bookmaking.

V V

Prior Lake, Minn., Telephone Company Sold

The joint application of William Saltmarsh, owner, Scott-Rice Telephone Co., Prior Lake, Minn., and the Scott-Rice Telephone Co., a corporation, to sell and buy, respectively, the Scott-Rice telephone property of Mr. Saltmarsh was granted by the Minnesota Railroad & Warehouse Commission on February 15.

The Scott-Rice company in addition to serving Prior Lake, serves Newmarket and Webster, Minn., and adjacent territory.

The Scott-Rice Telephone Co., a corporation, duly organized and existing under the laws of Minnesota, neither owns nor operates other telephone property in Minnesota.

In granting the application, the commission gave no consideration to the price to be paid and stated that nothing in the permission of sale should be construed as an approval of any increase or change in rates and charges, or diminution of service in the territory now served by that company.

Summary of Commission Rulings and Hearings

Federal Communications Commission

February 10: Granted extension of special temporary authority to American Telephone & Telegraph Co., Long Lines Department, Ocean Gate, N. J., to operate point-to-point radio-telephone station in the fixed public service, using its regularly licensed equipment and points of communication on frequency 10,515 kilocycles, 80 kilowatt power. Authority to continue from February 15 until further order of the commission, but not beyond December 1, 1945.

California Railroad Commission

February 9: Hearing on complaint of Edward Solomon against Southern California Telephone Co., Los Angeles, regarding service.

Kansas State Corporation Commission

March 6: Hearing on application of Farmers Cooperative Telephone Co., Halls Summit, for authority to make certain rate changes. Re-scheduled from February 27.

March 6: Hearing on application of Home Telephone Co., Scottsville, for authority to make certain rate changes. Re-scheduled from February 27.

March 6: Hearing on application of Lehigh (Kan.) Telephone Co. for authority to make certain rate changes for switching service there. Re-scheduled from February 27.

March 6: Hearing on application of Huron (Kan.) Telephone Co. for authority to make certain rate changes.

March 6: Hearing on application of Peoples Telephone Association, Athol, for authority to make certain rate changes.

March 6: Hearing on complaint of A. J. Detrixhe and three neighbors against Southwestern Bell Telephone Co. and American Telephone Co., Abilene, for relocation of boundary line.

V V

Telephone Operator Summons Police to Aid of Invalid

A Canton, Ill., telephone operator, who detected the signal when torn wires of a telephone became crossed, sent police to the home of Mrs. Bertha Hunt, a 70-year-old invalid, where they found that two men had broken into the home, beat the invalid, ransacked the house and stole $1,600.

Mrs. Hunt heard the men as they entered the house and reached for the telephone, but the men, rushing into her bedroom, snatched the telephone from her and tore it from its wires.

V V

Heads Farmline Program

The Michigan Bell Telephone Co. has further emphasized the role that rural service will have in its postwar plans by announcing the appointment of THEODORE H. DAWSON, district commercial superintendent at Lansing, to head its farmline development program.

INSTALL PAY STATIONS NOW
...for these 4 reasons
1—More service to more people, with—
2—Less use of materials and manpower.
3—Cooperation with the nation's war effort.
4—New Revenue.
USE THE NEW
"60" SERIES
Types for all central-battery exchanges.

These Autelco-Equipped Gray paystations provide the finest of paystation service. They are *modern* paystations, with the transmission circuit and components of Automatic Electric's newest Monophones. Thus, they provide high-quality transmission—especially important nowadays, when paystations are being used so extensively for long-distance as well as local calls.

All types of "60" series paystations are in stock—ready for immediate delivery. See them in our complete Paystation Catalog No. 4078—sent promptly on request.

Utilities Order U-2, the regulation that limits the installation of public telephones, specifically provides for "essential public paystations," and the use of wiring materials required in connection with their installation. For such installations, telephone companies are permitted to use the AA-1 preference rating granted by Utilities Order U-3 for maintenance, repair and operating supplies.

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Waynesboro, Va., Independent Gets New Manager

N. A. Hintze, new manager for Clifton Forge-Waynesboro Telephone Co., assumed his duties in Waynesboro, Va., on February 6. Mr. Hintze formerly was at Wausau, Wis., where he was manager for the Commonwealth Telephone Co.

Mr. Hintze replaces N. C. Coiner, who resigned his position as manager at Waynesboro on January 1.

The new manager was connected with the Commonwealth company for the past 23 years, during which time he served in the following capacities: Commercial supervisor for 34 exchanges at Plymouth, Wis.; district manager at Edgerton, Wis., and local manager at Prairie du Chien, Wis.

V V

Merle Hale Named to Board Of Nebraska Association

Merle M. Hale, acting commercial superintendent of the Lincoln (Neb.) Telephone & Telegraph Co., recently was named a director of the Nebraska Telephone Association to fill the unexpired term of H. F. McCulla.

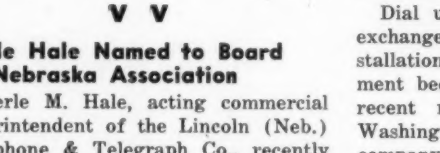
Secretary Kloidy of the Nebraska association reports that it closed the year with a membership of 105 telephone companies and 19 associate members, a gain of six. It now represents 213,440 company-owned stations in Nebraska, a gain for the year of 10,563 stations.

V V

Lincoln (Neb.) Company Has Increase in Rural Patrons

John H. Agee, general manager, Lincoln (Neb.) Telephone & Telegraph Co., reports that since 1930 rural service has been converted to dial operation in 30 of the company's 118 exchanges, and now serves 2,360 rural subscribers with this type of equipment. All other rural circuits are metallic and the total number of subscribers has increased 19 per cent in the last six years, despite wartime restrictions.

Dial units for a number of other exchanges have been ordered, and installation will be completed as equipment becomes available. Speaking of recent rural service discussions at Washington, Mr. Agee said that the company had always stood ready to assist farmers in meeting their telephone needs and in rendering aid to mutual or co-operative groups in improving their engineering, construction or operating methods.



HALE AND HEARTY

AND READY TO WORK FOR YOU!

Crossarms should be made of properly selected stock, adequately seasoned and carefully trimmed and bored.

That's the kind of product every telephone company would like to get when ordering crossarms — and that's just what you *will* get — every time — when you specify crossarms made by

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Telephone Operator Saves Four Lives

Quick thinking of a telephone operator on January 12 saved the lives of four persons overcome by gas escaping from a coal stove. Heroine in the near-tragedy who sent police and firemen to the basement flat was Miss Elaine Schmidt, operator at the Lafayette exchange of the Illinois Bell Telephone Co., Chicago.

Miss Schmidt became alarmed when an incoming call registered only the "O." She traced the call to the flat and rang but failed to get an answer. She called the fire department, informed her supervisor, Miss Alice McNellis, and then called the police. One of the victims was able to relate she had attempted to telephone for aid and collapsed after she had dialed.

V V

OBITUARIES

WILLIAM N. FAUST, 71, division plant superintendent at Kansas City, Mo., for the Southwestern Bell Telephone Co. before his retirement November 1, 1937, died recently.

He was born in Mansfield, Ohio, November 9, 1873, and began his career in the telephone business in Ohio in 1894 when he became associated with the Central Union Telephone Co. He helped construct telephone exchanges in Ohio, Michigan, New York and Kentucky.

In November, 1902, Mr. Faust went to Kansas City to help build the plant of the old Home Telephone Co. He continued working there until it became a part of the Kansas City Telephone Co. He became general plant superintendent and was serving in that capacity when the property was acquired in 1927 by the Southwestern Bell Telephone Co.

Mr. Faust leaves his widow, two daughters, a son and grandson.

* * *

JAMES C. WALL, president and general manager of the Staunton (Ill.) Telephone Co. since 1927, died February 11. Mr. Wall suffered a heart attack. He was a veteran of World War I and was active in organizations promoting the present war effort.

Mr. Wall is survived by his widow and a daughter.

* * *

RAYMOND H. ELLIOTT, for a number of years supervisor of supplies for the Lincoln (Neb.) Telephone & Telegraph Co., died at his Lincoln home recently. He began his career with the Auburn Telephone Co., now a part of the Lincoln company's system.

Need for Courtesy Explained By Alabama Telephone Manager

A mimeographed letter, entitled "Courtesy," recently was distributed to all employes of the Atmore (Ala.) Telephone Co. by Minor Corman, manager of the company. The letter also was reproduced by other telephone companies and distributed to commercial employes.

As the contents of the letter will be of interest to telephone employes it is reproduced below:

Courtesy

TO ALL EMPLOYES (Atmore Telephone Co.):

As a public utility with an exclusive privilege of supplying telephone service to Atmore and the surrounding area we assume an obligation in proportion to the importance thereof. Chief among the duties of performing this obligation is courtesy to our customers and to those with whom we work to supply a universal telephone service to any part of the world where such service is available.

Supplying telephone service is unlike the service of a garage, a filling station or the merchandising of commodities which are all highly competitive. If a customer feels that due courtesy has not been extended by these services and merchants, there are other places to go but that same customer must come back to us for telephone service no matter how grievous he may consider our offense. Therefore, our obligation is not to offend anyone no matter what the provocation.

As stewards of telephone service we have assumed an obligation and good stewards are always loyal to their task. The public and those with whom we work at home and in other exchanges have a right to demand nothing less of us.

If, at times, you feel that you have been sinned against, remember that two wrongs do not make a right. Present your grievance in a courteous manner and you will find few who will not humbly make amends and a way can be found to deal with that few.

An old woman in a tattered coat obediently bowed as George Washington and a friend passed by. In acknowledgment General Washington very graciously raised his hat. His friend, much amazed at such courtesy, inquired why. To this the general replied, "I do not propose that anyone, no matter what his station in life, shall be more courteous than I."

A gentleman removed his hat when ladies entered the elevator. When the ladies left at another floor a bystander remarked that there was no obligation to extend such courtesy. "Maybe there was no obligation to the ladies," he replied, "but I was certainly that much indebted to my own self respect."

Yes, we owe much to our own self respect and courtesy will go a long way in paying off the debt. Webster defines courtesy as politeness coupled with kindness and civility. Certainly we want to be polite, kind and civil.

FASTER, BRIGHTER, STRONGER SIGNALS

with

SYLVANIA TUNGSTEN TELEPHONE SWITCHBOARD LAMPS . . .

FASTER

because tungsten lights up more quickly than any other type of filament...only 1/5 second is needed to bring cold resistance up to hot resistance value. Because tungsten gives a high initial surge, giving quick operation of the relay.

BRIGHTER

because light is whiter, yet never too intense. Because higher brilliance is maintained *throughout* service life. Because filament is mounted near end of bulb for maximum end-on candle power.

STRONGER

because filament is extremely resistant to breakage. Lamps have average laboratory life of 1,500 hours.

SPECIFICATIONS

SYMBOLS	VOLTS	AMPERES MIN.	AMPERES MAX.	APPROX. COLD RESISTANCE OHMS	RATED AVERAGE B.C.P.
4A–2	4	.170	.210	2	135
4B–2	4	.270	.310	1.3	200
6A–2	6	.120	.160	4.5	225
6B–2	6	.270	.310	2	250
8A–2	8	.080	.100	9	250
8B–2	8	.100	.120	7	320
10A–2	10	.100	.120	9	190
10B–2	10	.240	.260	4.5	560
12A–2	12	.090	.110	12	295
15A–2	15	.090	.110	15	275
16A–2	16	.090	.110	16	340
16B–2	16	.270	.310	5	610
18A–2	18	.035	.050	46	165
18B–2	18	.090	.110	18	350
20A–2	20	.060	.085	27	365
20B–2	20	.090	.110	20	355
24B–2	24	.035	.050	61	140
24C–2	24	.060	.085	33	535
24D–2	24	.090	.110	24	610
30A–2	30	.060	.085	41	670
30B–2	30	.090	.110	30	490
35A–2	35	.035	.050	89	300
35B–2	35	.060	.085	48	645
35C–2	35	.090	.110	35	445
40A–2	40	.060	.085	55	425
44A–2	44	.060	.085	61	630
48A–2	48	.060	.085	66	625
48B–2	48	.090	.110	48	600
48C–2	48	.032	.038	185	145
55B–2	55	.090	.110	55	440
55C–2	55	.045	.055	104	425
60A–2	60	.045	.055	113	525

Sylvania Tungsten Telephone Switchboard Lamps fit standard sockets and can be used in any type of switchboard. Accurate manufacturing and testing methods assure tight, correctly formed bases . . . close tolerances are maintained to prevent sticking in sockets.

AVAILABLE IN: CLEAR, NATURAL RUBY* NATURAL GREEN*

**While present supply lasts.*

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SYLVANIA ELECTRIC PRODUCTS INC.

Salem, Massachusetts

MAKERS OF FLUORESCENT LAMPS, FIXTURES, ACCESSORIES; INCANDESCENT LAMPS; RADIO TUBES; CATHODE RAY TUBES; ELECTRONIC DEVICES

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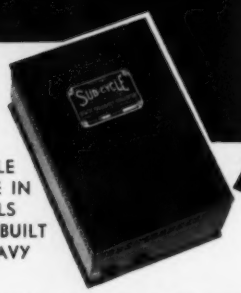
SUB-CYCLE ?



SUB-CYCLE IS MADE IN 6 MODELS AND IS BUILT FOR HEAVY DUTY.

WELL, YOU CAN BE SURE THERE'S:

- NO MOVING PART
- NOTHING TO ADJUST
- NOTHING TO REQUIRE ROUTINE MAINTENANCE
- NOTHING TO CAUSE RADIO INTERFERENCE

And On The Other Hand There Are *All* The Features That Assure A POWERFUL, ECONOMICAL, QUIET RINGING SUPPLY.

ALSO PULSATORS
Sold By Leading Distributors

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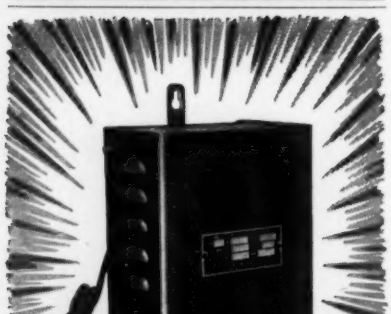

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BATTERY ELIMINATOR
GIVES WORRY-FREE SERVICE

Operates direct from lighting circuit. Delivers constant, humless D.C. to operator's circuit on magneto switchboard. Power-off relay assures uninterrupted service in case of power failure. Low in cost! See your jobber, or write direct for full information.

SCHAUER MACHINE COMPANY
2060 READING RD., CINCINNATI 2, OHIO

Earnings Not Considered by WLB in Wage Adjustments

The fact that company earnings are not to be considered in making wage adjustments during the war was revealed in a formal opinion of the National War Labor Board on December 21, 1944, although the opinion was not made public until January 31, 1945. It is the board's belief that the financial status of the employer should not be considered in wartime "when labor relations are controlled not in the interest of either the employer or the employes, but of the national war effort."

The occasion for the quoted language appeared to be a statement in a dissenting opinion in a case by industry members that ordered retroactive wage payments violated equity, justice, and sound public policy. The majority opinion said:

"The retroactive payments in this case are large primarily because it was so long in litigation. During all this time the company had the benefit of the labor of the employes. They were seeking higher wages and expected that this board would decide the dispute over these rates in accordance with the principles of the existing national wage stabilization policy. The company did not tell them or this board that it was unable to pay a fair wage. In view of this record, it cannot, in fairness, now raise this plea. The employes are entitled to the wages awarded them in return for the labor they rendered to the company.

"This does not mean that it may not be to their interest to make an arrangement with the company under which they either waive part of the retroactive payment or will accept those payments in installments over a considerable period of time. Any arrangement with regard to the retroactive payments which the parties may agree upon can be made by them without consulting this board. But it is not for us to say that the employes must accept less than is due them."

V V

H. B. Fine New Manager of Minnesota Community Company

Howard B. Fine has been appointed manager of the Minnesota Community Telephone Co., which operates 10 exchanges and approximately 3,200 stations, with headquarters in Waterville, Minn.

After completing one year at Kansas City (Mo.) Junior College, and various night courses, including business administration, accounting and business law, Mr. Fine entered the telephone industry in 1937 when he became associated with Telephone Services, Inc., then located at Kansas City, as secretary to Ralph Van Trine, vice president of the company. The company later moved its headquarters to Fort Wayne, Ind.

H. B. FINE

In 1942, Mr. Fine was made commercial and traffic supervisor of the Durham (N. C.) Telephone Co. and in February, 1944, he became commercial engineer in the plant department of the Durham company. He remained there until his appointment as manager of the Minnesota Community company.

While at Fort Wayne, Mr. Fine completed a night school course in public speaking offered by Indiana Extension University, and also completed night courses at Duke University, Durham, in personnel administration and engineering drawing.

V V

Serves as Co-Chairman

W. O. RANDALL, general manager Illinois Telephone Co., Jacksonville, Ill., is to serve as co-chairman of the Memorial Gifts Committee of the Passavant Memorial Expansion Movement, according to announcement made January 5 by J. N. CONOVER, chairman of the campaign executive committee.

V V

Name New Telephone Manager

BERT HOLLEN recently was elected manager of the Massena (Ia.) Independent Telephone Co. to succeed NED MURRAY, resigned. At this special directors' meeting, MRS. EDITH BANNICK and ELLA VOSS were re-elected operators.

V V

Named to New Posts

CHARLES A. ROBINSON was elected vice president, secretary and treasurer by the board of directors of the Chesapeake & Potomac Telephone Co. of Baltimore City. He succeeds H. RANDOLPH MADDOX, recently elected vice president and general manager of the District of Columbia branch of that company.

Small Exchange Conversions

(Concluded from page 15)

keep the present equipment. A compelling comparison on this point is found within the plant of one company. In one instance this company paid dearly in goodwill and revenue simply because it tried to hitch a new horse to an old buggy. First impressions are lasting and years of good service and diligent attention have failed to erase from the public mind the failures of those first few months. In the second case the cut-over was made to a completely new and modern outside plant. The service following the cut-over was next to perfect and the company's prestige jumped to a new high. Station development continues to be rapid and consistent.

It is a grave mistake to re-use old and antiquated telephones. The telephone instrument is the most intimate and tangible evidence of the service to the subscriber, yet it represents only a very small portion of the overall investment. If most of the old sets have not already been retired through proper procedure a drastic revision is needed in the accounting system. If they have been retired what purpose can be served by continuing to use them? It has been proved that the subscriber will gladly cover the cost of the newer, more modern instrument so there is nothing to be gained by compromising the matter. Let the conversion be complete. It will pay dividends. Don't forget, it is human to remember the quality of the merchandise long after the price is forgotten.

We shall not risk becoming tedious by extending this list of contributing factors to successful dial conversion. Suffice it to say that dial operation of the small exchange has long passed the experimental stage and the record of successful performance is secure. Nevertheless, the mere act of installing mechanical switching apparatus is not within itself a specific. On the contrary, it may be disastrous if not coupled with astute and aggressive management. Compelling as the record of dial operation may be, a penetrating examination of each example of successful performance will reveal that both human and mechanical tolerances have been anticipated and properly dealt with.

BUY WAR BONDS

STROMBERG-CARLSON
RECOMMENDS—

The
CHURCHILL
TELEPHONE BOOTH

An Invitation to Use the Pay Station

Operating companies have found the **CHURCHILL** No. 100 Folding Door Telephone Booth a builder of pay station business.

It is constructed as a single unit and equipped with a reinforced back panel for mounting a wall telephone or coin collector.

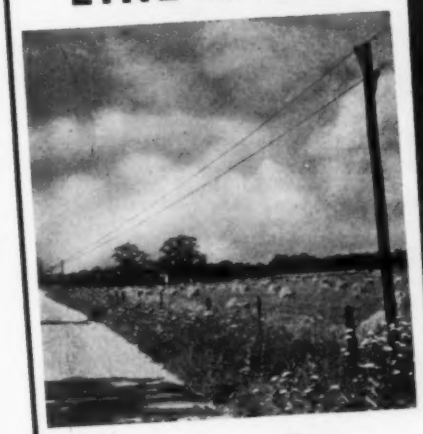
The **CHURCHILL** Booth is made of selected white oak and is available in light or medium oak in a satin finish.

Included as standard equipment are electric light and automatic electric ventilator.

Overall height is 84¾"; width, 29"; depth, 30½". Shipped knocked down and crated.

Illustrated literature available.

Crapo
HIGH-TENSILE LINE WIRE



For Long-Span Low-Cost Lines

Construction costs are reduced to a new low level, maintenance expense is minimized, wherever ***Crapo*** HTL-85 and ***Crapo*** HTL-135 High-tensile, Low-resistance Line Wires are used. These revolutionary wires, with their superior strength, make possible rural lines with span lengths one and one-half to two and one-half times greater than were practical heretofore.

Crapo HTL-85 permits spans to 225 feet in heavy, 325 feet in medium, and 375 feet in light loading districts; provides stronger spans on existing pole structures.

Crapo HTL-135 makes possible spans of from 350 feet in heavy to 500 feet in light loading districts. Both wires possess superior telephonic transmission qualities.

Crapo HTL-85

Crapo HTL-135

Write for technical data!

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EVERSTICK ANCHORS...

FOR SPEED IN INSTALLATION

The exclusive Everstick nut housing locks the Anchor firmly on the rod. This speeds up installation. Plates are so designed, that they expand easily into undisturbed earth, and extra holding power is achieved. Made of tough, rust-resistant malleable iron. Write for bulletin.

EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

Pull Poles the Easy, Simplex Way!

No. 329, capacity 15 tons, height 37¾", lift 22".

One or two men with the Simplex Pole Pulling and Straightening Jack can pull or straighten any pole, regardless of size or depth; pull butts or move loaded poles. Saves manpower and reduces "out of service" hours.

Simplex
LEVER SCREW - HYDRAULIC
Jacks

Templeton, Kenly & Co.
Chicago (44), Illinois
Better, Safer Jacks Since 1899

H. B. Flower, Now in Europe, Promoted to Major

H. B. Flower, formerly plant superintendent of the Iowa Continental Telephone Co. and associated companies, recently was promoted to major. Major Flower is with the 19th Tactical Air Command in Europe and has charge of all telephone and teletype communications for the command. The command furnishes air coverage for Lieut. Gen. George S. Patton's forces.

During the first several months that Major Flower was in Europe, he was in England serving with the Royal Air Force.

General Patton has praised the vital importance of the tactical air force in helping ground forces defeat the enemy. He explained that his advance across France would have been impossible had it not been for the support and information given his ground forces by the U. S. Ninth Air Force fighter and medium bombers.

"The coordination between the air and ground has reached the perfection we dreamed about years ago," he said.

Answers to Traffic Questions On Page 26

(1) Yes. This is the most satisfactory method.

(2) If it is not possible to establish a satisfactory connection and a request is received to repeat the message, it is customary to do so, first explaining that the telephone company does not assume responsibility for error in repeating the message.

(3) No. This condition is the equivalent of answering a recall on a common battery switchboard where the customer requests the operator to re-ring the called number.

(4) In entering a report on the ticket, identify it with the station from which it was received by entering the telephone number (or the address name in the case of hotels) in parenthesis after the related report.

(5) You should not release the circuit, but should say, "I have passed a call," in order to establish precedence for the use of the circuit.

When a call, report or order has been passed and acknowledged, it takes precedence over all other calls except emergency or priority calls.

Maintain Those Keys, Drops, and Jacks

When the thimbles and springs get badly worn, take out a bank or two of drops at a time and send them to Suttle for complete remanufacturing. If you have no extra drops, order replacement banks. Most styles and makes are in stock at Suttle.

Do the same thing with your keys. It's a simple, inexpensive way to keep your magneto switchboard working perfectly.

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IMPROVE PARTY LINES

ELIMINATE NOISE
with the
Improved RTC-2 VINCENT
RARE GAS RELAY
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Dual purpose device which economically improves both ringing and transmission on party lines.

NO MOVING PARTS.
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Newspaper Pays Tribute To Industry's Record

The Zumbrota (Minn.) *News* recently published an editorial which upheld the telephone industry's effort to serve the rural areas. Zumbrota is served by the Zumbrota Telephone Co., of which F. C. Marvin is manager.

The editorial is as follows:

Spreading the Net

The stage is being set to put the government into the telephone business with an appropriation of $100,000,000, after the pattern of the Rural Electrification Administration. Public officials are attacking the telephone industry, including thousands of small Independent companies, for alleged failure to sufficiently increase the number of rural telephones. In a nation that has more telephones than all the rest of the world put together, it seems a bit ridiculous to start blackening the industry that made this record.

It would be interesting to know whether any of the gentlemen fostering this further step toward socialism, lives on a farm and has tried to get a telephone during the last several years. If he has, he knows that he could not get a telephone because of the various war restrictions. He knows that he couldn't buy telephone wire, and he couldn't buy a telephone. He knows that the local telephone companies are prohibited from allowing him any material or making a connection for him unless he happens to be a government official, or doing certain war work.

Given the material, there is no doubt that thousands of farm telephones would be installed within a short time without any $100,000,000 appropriation of taxpayers' funds. Just how installation of telephones with public funds would be any less damaging to the war effort than private installation, is not made clear. But, as Francis X. Welch, writing from Washington, says: "At least we have a right to expect that responsible federal agencies should present the picture fairly with all relevant facts in the true perspective. If that is done, the telephone industry will surely not shrink from its responsibility, whatever that may be in the future."

V V

Telephone Service More Vital Than Radio, Interviewer Finds

In answer to the question, "If you had to do without either the radio or telephone, which would you rather give up?" three out of five persons interviewed by Kay Allen, conductor of the column, "Times Talkies," expressed a preference for the necessity of telephone service over use of the radio.

Representative replies given were: "I'd give up the radio and keep the telephone. No radio would help notify a doctor in case of sickness in the home. No radio could be a means of personal visits between friends miles apart." "I think the telephone is more essential both for business transactions and personal conversations. I find it a simple matter to talk my average of one hour per call over the telephone." "Somehow my first impulse is to say, 'Preserve the radio.' But I'm almost afraid to because I'd miss the convenience of contacting people in a hurry in times of emergency."

V V

Telephone Operators Eulogized On National Radio Hook Up

On a recent broadcast over The Blue Network of "The Falstaff Show," a program sponsored by the Falstaff Brewing Corp., St. Louis, Mo., a good night toast was dedicated to telephone operators.

Such toasts are presented on every broadcast of this program, dedicated to a person or group of persons who merit the appreciation and recognition of their fellowmen. At one such broadcast, the family physician was eulogized.

It is believed that it is not only members of the telephone industry who realize the important job the telephone operators are doing, as shown by the following toast to the girls who have "the voice with a smile."

Toast to the Telephone Operator

Here's to a girl we've never seen;
She may be stout, she may be lean;
She may be halfway in between . . .
We have no way of knowing.

But though she's never met our eyes,
It's her we want to eulogize;
Tonight we'd like to recognize
The debt to her we're owing.

No business could go its way
Without the work she does each day;
No queen a greater realm can sway
From Michigan to Texas.

She helps to make each far-flung state
Unite, instead of separate;
No distance for her is too great;
Her nimble work connects us.

At dusk or dawn or dead of night,
She's ready, waiting, calm, polite,
To do her job and do it right,
Though needs be small or greater.

So join in on this toast, my friends,
To her on whom so much depends,
The girl who to our 'phone' calls tends!
Here's to the operator!

V V

Included in Panel Group

WILLIAM V. KAHLER, general manager for the state area, Illinois Bell Telephone Co., was a commerce member of the panel group comprised of men outstanding in the fields of agriculture, industry, education and communications which met in Elgin on February 20 at the second, all-business conference sponsored by the Elgin (Ill.) Association of Commerce.

PORCELAIN DROP WIRE ACCESSORIES

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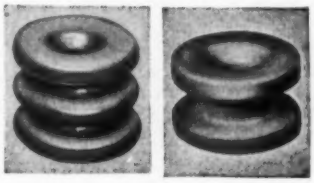
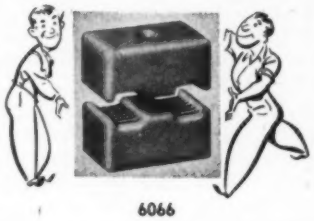


PORCELAIN KNOBS



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OUR COMPLETE LINE INCLUDES

1, 2 and 4 groove
PORCELAIN KNOBS

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5/8" and 1"
INSULATED SCREW EYES

5/16", 5/8", 7/8" and 1"
STRAIN INSULATORS

5/16" and 3/8" hole diam.
PORCELAIN TUBES

Write Today for Catalog No. 644-A.

BUCKEYE
TELEPHONE & SUPPLY CO.
COLUMBUS, OHIO

Supplies Navy with First Standard Multiple Boards

The Kellogg Switchboard & Supply Co., Chicago, recently was placed on the U. S. Navy list of suppliers for furnishing multiple type switchboards, small magneto switchboards, test cabinets, etc.

By this development, the Kellogg company becomes the first supplier of standard multiple type switchboards for the Navy, it is reported.

V V

A. B. Crawford, Stromberg Representative, Dies

Arthur B. Crawford, a pioneer in the telephone business, died at Springfield, Ohio, on January 28 at the age of 69, following a six-month illness. He had been at the home of his daughter, Mrs. Grant C. Melvin in Springfield since December 12 when he was removed from the Strong Memorial Hospital at Rochester, N. Y.

Mr. Crawford was associated with the Stromberg-Carlson Co. almost continually since starting with the company in 1904 as sales representative in Ohio. He left Stromberg-Carlson in 1921 to form a partnership with Gustav Hirsch under the name Hirsch Crawford Co. and continued with that company until January, 1923. After his return to the Stromberg-Carlson organization, he represented the company in the Pennsylvania territory and later in the Virginia, Tennessee and Carolina territories. At the beginning of the war, he was transferred to the Rochester Office to aid in war production activities.

A. B. CRAWFORD

Mr. Crawford started in the telephone business in 1893. He held life membership in the Independent Pioneer Telephone Association and also was a member of the Genesee Chapter, Telephone Pioneers of America.

In addition to his widow, two daughters and two sons, Mr. Crawford is survived by his mother, Mrs. Elizabeth Crawford, and a sister, Miss Maude Crawford of Shiloh, Ohio.

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NEWBERRY—GRAND RAPIDS
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POLES

B. J. Carney & Co., 100 N. 7th St., Minneapolis, Minn.—Western red cedar poles. Pentrex Butt Treated or Plain.

C. M. Christiansen Co., Phelps, Wis.—Northern White Cedar Poles, plain or butt treated. Quotations on request.

International Creosoting and Construction Co., Galveston, Texas.—Creosoted Southern Yellow Pine Poles. Plants: Beaumont and Texarkana, Texas.

T. M. Partridge Lumber Co., Minneapolis, Minn.—Northern White—Western Red Cedar Poles. Plain or butt-treated.

Pensacola Creosoting Company, Pensacola, Fla.—Creosoted Southern Pine. Poles of Superior Long Leaf Quality.

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SALES ENGINEER
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By Manufacturer of Standard Construction, Maintenance and Service Equipment for Public Utilities

The largest and favorably known manufacturer of public utilities equipment, established for 35 years, has opening for Sales Manager.

Must have experience in construction maintenance and service of motor vehicles, some sales and sales promotion experience. Be able to organize Sales Department. He will also handle advertising.

Must be aggressive and willing to work. Real opportunity for Go-Getter. Good Salary—Steady Employment.

If you are interested, appointment will be made for personal interview on receipt of letter giving brief detail of your experience. Write Box No. 2144, c/o Telephony, 608 So. Dearborn St., Chicago 5, Illinois.

Reconstructed Equipment

Kellogg or Dean 100 ohm drop coils @	$0.35
Reliable Elec. No. 7A or T. Fiber Fuses @	.05
Switchboard cord weights @	.20
Kellogg or W. E. Now composition Rec. Shells and caps @	.40
Kellogg, Dean, W. E. Monarch, Stromberg or Am. Elec. Composition Mouthpieces. (New) @	.60
Dean Talk Through Repeating Coils @	.75
Kellogg No. 1025 C. B. Lineman test set, all metal type with 2 Cond. cord less test clips @	4.25
Western Elec. No. 1001-C all metal hand set with push Button in handle, complete with 3 Cond. Cord @	5.00
Western Elec. No. 2c Ball type drops and jacks per strip of 5 @	8.25
Western Elec. No. 22c Shutter type line drops and jacks per strip of 5	10.50
Kellogg No. 103 I M. F. Condensers @	.40
48 Volt Swbd. Lamps per 100	5.00
Kellogg Listening ringing and ring back keys latest type with Battery cut off @	3.75
Stromberg-Carlson double cut-off jacks 10 per strip @	3.00
Kellogg No. 115 Grabaphone with all metal hand set complete with 3 Cond. cord @	7.00

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